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KEYWORDS	ABSTRACT
Practical Culinary Education; Nutrition Awareness; Food Literacy; Cooking Skills; Students	The practical learning of nutritional education has become more of a focus and is regarded as an experiential method to enhance students' understanding of nutrition and build lifelong food-related skills. This research focuses on the impact of hands-on culinary training on nutrition awareness among students, specifically on nutrition knowledge, cooking skills, food literacy, self-efficacy and informed food choices. This research is qualitative descriptive-interpretative type of study which is in the secondary data only. Qualitative document analysis and thematic analysis was used to examine relevant peer-reviewed research articles, academic publications, educational reports, curriculum documents and other credible sources related to culinary education, nutrition education, cooking skills and food literacy. The results highlighted five important themes: development of nutrition knowledge, strengthening cooking skills and self-efficacy, building food literacy and informed food choices, experiential learning and student engagement, and barriers to the transfer of culinary knowledge to long-term dietary changes. The analysis suggests that, as a subject, practical culinary education has the potential to effectively link theory with everyday food practices and offer students practical skills and confidence in preparing and evaluating food. There is some evidence, however, that raising awareness about nutrition and cooking skills does not always lead to lasting changes in diets, and factors related to socioeconomic systems, family nutrition habits, cultural preferences, food access and food environments may play a role in shaping dietary choices. The study concludes that, in order to deliver practical culinary education, it must be combined with the traditional nutrition education as a part of food-literacy strategy. This integration can empower students to learn and practice healthier and more informed food habits and gain knowledge, skills, confidence and decision making capabilities.
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Introduction

Nutrition awareness has been a growing part of students' education as children and youth are faced with a complex food environment of convenience foods, highly processed foods, aggressive food marketing and changing food consumption patterns. It is increasingly recognized, then, that developing the capacity to understand food, assess nutritional information, choose appropriate components to make a meal, and prepare a healthy meal is an important part of the health and life-skills curriculum. Food literacy has been defined as a complex competence that encompasses food-related knowledge, skills, attitudes, behaviors and food decisions making (Ares et al., 2023). These competencies are especially relevant during childhood and adolescence as food-related knowledge and practices at these early ages can shape subsequent diet and health.

Typical nutrition education has often focused on providing nutrition information and concepts, such as nutrients, food groups, calorie information, and healthy eating. But merely knowing what to eat doesn't automatically mean you will be able to cook healthy meals or have the confidence to make good food decisions. In recent years, then, the focus of scholarship has increasingly turned to experiential and practical teaching methods that link nutrition concepts to nutrition practices in the real world. According to Ares et al. (2023), food literacy is not only a matter of nutritional knowledge, but also of the various skills and experiences that can help build a well-informed and informed attitude toward food. Practical learning about food can be a valuable way in which abstract nutritional concepts can be linked to real-life experiences such as selecting food, measuring quantities, reading recipes, cooking and preparing food, understanding about food safety, and the nutritional quality of food.

Empirical evidence in recent years supports the educational value of incorporating cooking to nutrition education. Cooking interventions demonstrated that cooking skills and food literacy were improved in the majority of studies in a systematic review of cooking classes conducted in schools with children aged 4-12 years, but not all studies showed an impact on vegetable intake (Vaughan et al., 2024). In a similar manner, van der Horst et al. (2024) analysed 23 cooking intervention research and identified cooking knowledge, self-efficacy and children's engagement in kitchen cooking as the most common positive outcomes. But the review also found that while people's actual eating habits improved somewhat, the improvement was not consistent, meaning that culinary education cannot be taken as a given to automatically produce healthier diets without taking into account other social and educational factors.

The experiential aspect of the teaching of food is essential because in this way the students can put to use their nutritional knowledge in meaningful contexts. Investigating the participants' perceptions of a school based experiential food education program, St Pierre et al. (2024) showed that food related learning experiences have the potential to impact participants' food choices outside the educational sphere. Similarly, Mancone et al. (2024) reported a positive effect of the multifaceted food-literacy intervention on adolescents' nutrition knowledge and food-related self-regulation. The results indicate that nutrition awareness can be more easily developed through

giving students opportunities to engage in hands-on activities rather than just hearing about nutrition.

Recent studies continue to illustrate the promise of culinary instruction at a variety of instructional stages. A nutrition course with cooking labs was found to enhance cooking-related knowledge and eating habits in university students and to have positive effects on other life skills like teamwork, time management, and financial literacy by Yoon and Jun (2025). Likewise, Sullivan et al. (2025) studied a food-literacy boot camp for high school students and found that practical skill building, knowledge and behavior change, and student involvement are important aspects of the learning experience. The results confirm that culinary education is not only a means of vocational training, but also a practical health education.

The importance of practical culinary education is also reflected in recent curriculum research. A food-literacy curriculum that integrates cooking, agriculture, and nutrition, called Teens CAN, has shown promise for positively affecting food-literacy outcomes among youth. A 2026 pilot study found that students in the intervention group had a significant increase in nutrition knowledge, and that a student's ability to cook and eat a healthy diet were two key measures of food literacy (Sklar et al., 2026). Likewise, studies on experiential food learning in the school environment reveal that the continued involvement in food experiences can build the nutrition knowledge and confidence of students in their daily food skills.

However, the current literature shows that there is a complex connection between culinary education and nutrition awareness. Cooking skills are not an isolated phenomenon, but are also linked to socioeconomic conditions, family food practices, cultural traditions, food availability and the broader educational context that students are exposed to. More recent studies have shown that cooking programmes have different effects depending on the length of the programme, the design of the programme, the age of the participants, the learning context, and the specific competence(s) being addressed (van der Horst et al., 2024; Vaughan et al., 2024). Thus the purpose of practical cooking education should not be considered as merely teaching students the recipes they will use in the kitchen, but also their role in developing other types of nutritional knowledge and food literacy.

In this context, the present study discusses the importance of practical culinary education in the nutrition awareness of students. The study follows a qualitative approach and relies on secondary data and existing literature and educational evidence to provide a summary of emerging themes on nutrition knowledge, healthy food choices, cooking skills, food literacy and student engagement with food. The aim of the study is to create a deeper understanding of the potential practical culinary education has to supplement traditional nutrition information and to help students develop informed, confident, and healthy food practices.

Statement of the Problem

Although the roles of nutrition education in supporting healthy eating behaviors in children and adolescents have been increasingly acknowledged, traditional nutrition education programs in

classrooms focus on teaching knowledge about food and nutrition but lack practical opportunities to allow students to make use of their nutritional knowledge in their daily food practices. Practical culinary education has the potential to be a valuable way to learn, and involves a variety of activities including food preparation, ingredient selection, meal planning and cooking. Cooking confidence, food knowledge, and elements of food literacy can be enhanced through school-based cooking education, though impacts on food consumption behaviors and food intake remain variable (Labbé & Ward Chiasson, 2023; Vaughan et al., 2024). In the same vein, the recent experiential nutrition programs have shown mixed results and implementation challenges, indicating the need to further explore the connection between experiential culinary learning and nutrition awareness (Karpouzis et al., 2024). Hence, it is necessary to study the existing evidence critically to find out how and in which situations a practical culinary education helps the students to be aware of the nutrition. This study aims to fill this gap by studying the role of practical culinary education in the development of students' nutritional knowledge, food literacy, healthy food choices and practical food related skills by means of qualitative analysis of secondary research and documentary sources.

Significance of the Study

This study is important because it emphasizes the practical aspects of culinary education, a complimentary approach to traditional nutrition instruction, and an understanding of the way a student can apply nutrition knowledge into his or her own food choices. There is currently some evidence that cooking education through cooking can improve cooking skills, food knowledge and confidence in cooking – and that experiential learning methods can also influence positive attitudes towards healthy foods and health-related behaviour (Sullivan et al, 2025; Vaughan et al, 2024). This study's results can also be applied by teachers, curriculum developers, schools, nutrition educators and nutrition policy makers interested in incorporating hands-on food and culinary education into the school curriculum. The study may also help to shape the food literacy movement in terms of the idea that awareness of nutrition is not just about what makes a healthy diet, but knowing and being able to apply the skills and confidence to make the right food choices and plan suitable menus. Additionally, the study can synthesize existing evidence, rather than gathering new data, and can reveal common findings, challenges, and opportunities in different educational settings and can serve as a basis for further empirical research and curriculum development.

Scope of the Study

The study is centered on the importance of hands-on culinary training in the creation of nutrition awareness among students and qualitative analysis of secondary data is only utilized in this study. Existing peer-reviewed research articles, academic publications, educational reports, curriculum documents and other credible documentary sources which relate to cooking education, food literacy, nutrition education, healthy eating, cooking skills and students' food-related knowledge and practices will be studied. Analysis will be focused primarily on school-age children and adolescents; evidence of older students, if relevant, will be included if it contributes to analysis of the educational role of culinary learning. The emphasis of the study will be on the impact of practical cooking activities on nutritional knowledge, awareness of healthy food choice, food

preparation skills, confidence and food literacy rather than to make claim to statistically measure dietary outcomes. Examples of evidence from various education and geographical settings will be taken into account to detect what is common and what is different across each of them. The studies that are not related to educational culinary activity, or only clinical nutrition without any relevance to the food education of students will be excluded from the study.

Research Objectives

- To understand about the contribution of practical culinary education in students' nutrition awareness.
- To explore how cooking activities stimulate students' learning about healthy eating, balanced diets and basic nutrition.
- To examine challenges and opportunities of incorporating applied culinary instruction into students' learning to raise long-term nutrition awareness and healthy eating habits.

Research Questions

- What role does the culinary arts play in raising nutrition awareness in students?
- How might hands-on cooking experiences impact students' knowledge about healthful food selections, balanced nutrition, and nutrition basics?
- What are some of the obstacles and possibilities for integrating the hands-on aspects of culinary education to raise nutrition awareness and healthy eating habits among students?

Research Design

This study used a qualitative research design to gain insight into the role of education in the culinary arts in the development of nutrition awareness among students. A qualitative approach is suitable because this study aims to understand and interpret the existing evidence on the nutritional knowledge of students, their food choices, cooking skills and learning experiences, rather than to statistically measure relationships between variables. Qualitative research allows the researcher to explore the meaning, patterns, perspectives, and contextual aspects of a collection of written texts (Creswell & Poth, 2018).

Specifically, this study uses descriptive-interpretative research design using secondary data. The research doesn't include primary data collection by interviewing, questionnaires, and observation. Rather, it critically reviews the current academic research and related documentary evidence related to the practice of culinary education and nutrition awareness. Documentary research is the best method for use when the goal is to combine and analyze the information that has been

published in other documents. While document analysis is defined by Bowen (2009) as the systematic examination and interpretation of documents to develop understanding and generate knowledge, the term document analysis can also refer to the process of analyzing documents and data. Document analysis can also mean the analysis of documents and data as defined by Bowen (2009) as the systematic examination and interpretation of documents to develop understanding and generate knowledge.

The research will be based on peer reviewed research articles, academic books, educational reports, curriculum documents, institutional publications and policy documents related to culinary education, food literacy, nutrition education, cooking skills, healthy eating, student's food literacy and related practices. Use of several documentary sources will enable the study to detect the patterns and perspectives that emerge and to obtain a broader understanding of the educational value of practical cooking activities.

An interpretive orientation is used as the basis for guiding the design, since the study aims to gain an understanding of the representation of practical culinary education in the current research and how its role in nutrition awareness can be understood in various educational settings. This study will thus aim to uncover common elements with respect to the link between cooking education and nutrition knowledge, healthy food choices, nutrition awareness and the formation of sustainable food practices.

Research Methodology

Research Approach

The study uses a qualitative approach to research. Qualitative research can be used when exploring a complex educational phenomenon in which understanding the meanings, experiences, practices, and contextual relationships rather than the numerical measurement of the phenomenon is more important (Creswell & Poth, 2018). This approach allows for a closer look at the current evidence of the role that practical culinary education can play in students' nutrition awareness within this study.

Data Collection Procedure

The researcher will carry out a programmatic search of pertinent academic literature and documentary sources. First, the keywords "practical culinary education," "cooking education," "nutrition awareness," "food literacy," "cooking skills," "nutrition education," "healthy eating" and "students" will be used to identify sources.

Once identified, the sources will be screened based on the inclusion and exclusion criteria. The relevant documents will then be reviewed, and sorted by relevance to the research questions. Systematic extraction of key information regarding the teaching and learning of cooking, students' nutritional knowledge, food choices, cooking skills and obstacles will be recorded.

The systematic treatment of documents is consistent with Bowen's (2009) approach to qualitative document analysis that involves the review, analysis and interpretation of documents to uncover meaningful patterns.

Data Analysis

The study will use qualitative thematic analysis to analyze the selected secondary data. Thematic analysis can be used because it helps the researcher to recognize, categorize, explain and describe the recurring patterns or themes of a set of textual data (Braun & Clarke, 2006).

The analysis process will be structured around 6 general phases:

Reading and re-reading selected documents:

- Familiarisation with the data – The selected documents will be read and re-read to gain an overall sense of the evidence.
- Initial codes: Relevant statements and concepts related to culinary education and nutrition awareness will be coded.
- Theme searching: Related codes will be clustered together into themes.
- Themes will be checked against the original documents for representation of the evidence: Reviewing themes.
- Defining and naming themes: For each theme a clear definition will be provided in relation to the research questions and to the other themes.
- Reporting the results: The final themes will be interpreted and communicated as a whole and coherent answer to the research questions.

The thematic approach is especially appropriate in cases where qualitative data needs to be analyzed in a flexible way for patterns, as it is in Braun and Clarke's approach. In addition to methodological efforts that highlight the need for a systematic process to enhance the trustworthiness of thematic analysis, subsequent methodological contributions focus on the importance of having a clear and systematic process of analysis (Nowell et al., 2017).

Themes are anticipated to emerge from this analysis with themes related to the development of nutrition knowledge, understanding of healthy food choices, practical cooking competence, food literacy, confidence in food preparation, and barriers and opportunities for culinary education. These themes are not pre-determined as findings, but they are developed and refined by engaging the chosen secondary sources.

Trustworthiness

The study will keep a clear and systematic record of the process of source selection, screening of the documents, coding, development of themes and interpretation, to assure the trustworthiness of the research. Findings will be based on evidence from more than one source (not just one publication or point of view). The researcher also will compare and contrast evidence from studies, and find both converging and diverging results.

The qualitative analysis will be evaluated using the criteria of credibility, transferability, dependability and confirmability which will be applied (Lincoln & Guba, 1985). Specifically, there will be a traceability of the analytical process which will facilitate the development of codes and themes which are in turn traceable to a specific audit trail. Thematic analysis is recommended to be documented systematically to enhance the credibility and transparency of the thematic analysis (Nowell et al., 2017).

Ethical Considerations

No interviews, a questionnaire or personal data will be collected because the research is based on secondary sources that have been made public. Ethical research practices, however, will be ensured by the accurate use of citations, proper acknowledgment of the original authors, faithful representation of the source material and the avoidance of plagiarism or misrepresentation. References should be cited in APA (7th Edition).

Theoretical Framework

The current study follows the Food Literacy Framework as a suitable theoretical perspective for studying the role of hands-on food education in developing nutrition awareness among students. Food literacy is not just knowledge about nutrition, it is the knowledge, skills, confidence, attitudes and critical awareness needed to plan, choose, prepare and eat healthy food (Vidgen & Gallegos, 2014). In this context, practical culinary education is seen as a process of experiential learning and is conceptualized as a process that enables students to make a connection between the theoretical knowledge of nutrition and practical activities such as selecting food, reading food labels, planning meals, cooking food, and making informed nutrition choices. Recent studies also highlight the multidimensional nature of food literacy, including cognitive, technical, social and behavioral skills, and how these can be leveraged to enhance healthier and more sustainable food practices (Ares et al., 2023; van der Horst et al., 2024). Thus, the Food Literacy Framework offers a valuable framework to help analyse secondary data on the potential of hands-on culinary experiences to improve students' nutrition knowledge, cooking skills, confidence, awareness of healthy food choices, and food decision-making abilities.

Review of Literature

Conceptualizing Food Literacy and Nutrition Awareness

In recent years, the link between nutrition education and students' daily food behaviours has been increasingly studied. Typically, nutrition education has been directed at information about nutrients, food groups, balanced nutrition and health effects of food. But knowing about healthy eating doesn't automatically mean people can make healthy food choices and create healthy meals. This constraint has led to the development of a broader definition of food literacy, which includes nutritional knowledge, food-related skills, confidence, attitudes, decision making, and competencies. Vidgen and Gallegos (2014) defined food literacy as a set of interrelated skills and knowledge that allows people to plan, manage, choose, prepare and consume food for health and well-being. The framework continues to be influential, since it shifts the focus away from information and at the same time towards competence in food in a practical and cognitive sense.

This knowledge has been expanded upon in more recent scholarship. According to Ares et al. (2023), food literacy is a concept that involves relational, functional and critical skills that are acquired using cognitive development, socialization and practical learning. They highlight the need for nurturing children and young people to become food literate, as these are critical ages of life in which their food-related knowledge and practices can be set for life. Food literacy is not just about what happens in the classroom and is related to the ability to navigate complex food environments.

Likewise, Omidvar et al. (2023) identified school-based food and nutrition literacy initiatives to be effective at enhancing functional and to a certain degree interactive and critical food-related capabilities amongst children in primary school. They specifically stressed integrated curricular-based interventions and those tailored to students' needs and provided by teachers in a systematic review. The results indicate that nutrition education could be even more effective if students are engaged in learning, rather than being passive consumers of nutritional information.

Practical Culinary Education as Experiential Learning

Practical culinary learning is an important experiential aspect of food literacy. Cooking offers students a chance to take component parts of nutrition and turn them into real food items by selecting ingredients, measuring portions, following recipes, cooking, and assessing the nutritional value of meals. In a critical review of children's culinary nutrition interventions, Lavelle (2023) concluded that culinary education was a promising intervention to influence dietary, psychosocial, and well-being outcomes. The review also highlighted significant differences in the kind of interventions, the length of interventions, the educational content of interventions, and what was measured to determine the outcomes. But this variation complicates the identification of any one model of culinary education that is universally effective.

This is especially important as cooking is an experiential activity, and students can learn by doing.

Elsborg et al. (2022) studied a food-camp intervention based on five dimensions of food literacy: knowing, doing, sensing, caring and wanting. They have proven that food literacy can be applied to practical cooking skills as well as sensory experiences, motivation, and desire to address food-related concerns. This multi-dimensional approach questions the one-dimensional perception of nutrition awareness, which is only about learning.

Likewise, food literacy and cooking skills were targeted in the Vaughan et al. (2022) designed PhunkyFoods intervention for primary-school children. Overall, the intervention highlights the growing trend of incorporating food education, hands-on cooking, and nutrition and eating habits in school settings. These methods put cooking not only on par with other domestic or vocational skills, but also make it part of education for health and life skills.

Evidence from School-Based Cooking Programs

Cooking programs in schools is one of the best-reviewed topics on recent literature. Vaughan et al. (2024) conducted a systematic review of school-based cooking programs that included children aged 4-12, and concluded that there were small positive effects on cooking self-efficacy and vegetable consumption. Importantly, programs that included greater than 6 hours of cooking had relatively larger effects. Despite that, the review noted inconsistencies in the measurement of food literacy and cooking confidence, indicating the need for more consistency in research methods to be used in the future.

Van der Horst et al. (2024) also conducted a review of 23 intervention studies that included children's cooking programs. Their results revealed that gain in cooking knowledge, cooking self-efficacy, and increased children involvement in cooking were among the most common positive results. But, changes in food consumption were fairly rare. It is significant that this separation implies that hands-on culinary training can have a more direct impact on skills, confidence and awareness than diet. So, the notion that cooking education for children leads to healthier diets must be qualified.

The results of these systematic reviews align with studies that have looked at school-based nutrition intervention in general. Chatterjee and Nirgude (2024) found that school-based nutrition interventions can lead to improved dietary behaviors and health outcomes related to nutrition and lifestyle in children and adolescents. However, effective implementation of these programmes requires the educational context, the nature of the interventions, their length and the social context of students.

Additionally, school-based interventions may incorporate culinary learning and gardening and nutrition education. The findings cited by the American Society for Nutrition (2023) suggest that when nutrition education, gardening and cooking are all included, there are positive effects on increasing the intake of unprocessed foods and decreasing ultra-processed foods. This indicates the need for food education to be enhanced by experiencing several stages in the process of food, beginning from the growing phase, the selection of food ingredients, the cooking phase and the

eating phase.

Culinary Education and Nutrition Knowledge

One of the other important issues in the literature is the link between nutritional knowledge and cooking skills. Mancone et al. (2024) studied a comprehensive educational intervention that included theoretical learning, hands-on exercises, and online resources for young people. The intervention aimed to include nutrition knowledge, food-label interpretation, cooking skills, self-regulation, and healthy eating. They found that these two methods – cognitive and practical education on nutrition – are able to produce fruits and vegetables and can be considered as a single educational event rather than two independent ones.

Likewise, Parsons et al. (2024) designed a nutrition education, mindful eating and cooking skills-based curriculum for college students called Master Chef. Their work illustrates the trend toward the view that culinary education can offer a viable pathway for the transfer of nutrition knowledge to food-related behavior. The curriculum is not taught in isolation of the cook but is integrated.

There are also implications of culinary education for the preparation of future nutrition professionals. Renard et al. (2024) investigated the nutrition and dietetics students' level of culinary nutrition skills in the UK, and concluded that cooking and food involvement played key roles in promoting nutrition and dietetics students' confidence in cooking and food skills. Their study indicates that opportunities to enhance students' practical skills in cooking and preparing food have potential benefit to students, even if they have formal nutrition education.

Culinary Education, Self-Efficacy, and Food-Related Behavior

Another common theme in the benefits of hands-on culinary training is the concept of self-efficacy. Confidence can impact whether or not students are willing and able to cook food for themselves. Evidence from research with university students shows that hands-on teaching kitchens can reinforce this aspect of food literacy. For instance, a study with a food-skills course with an interactive teaching kitchen in 2024 tested food-related behaviors and dietary self-efficacy in college students, revealing the effectiveness of hands-on learning to overcome food-related barriers to healthy eating.

Carr et al. (2025) also found a short cooking intervention among university students who frequently consumed food from a food pantry was linked to improvements in overall food literacy, health and nutrition knowledge, cooking skills, and home cooking frequency. This discovery is especially significant as it demonstrates the potential ways in which culinary education can be used to help students who are limited in their financial resources or food access. Cooking skills may be useful to impart practical knowledge to students to help them understand how to prepare affordable meals and use their nutrition knowledge in real world situations.

A dietary life-skills course, with ten practical lessons in a university teaching kitchen, was also

explored by Valand et al. (2025). The course covered nutrition, meal planning, budgeting food, sustainable food and how to prepare meals. The study represents a trend of employing food education as a life skill instead of purely technical cooking skills.

There are also studies that prove cooking refresher courses for university students are effective in improving cooking skills by providing structured practical lessons. The implications of these findings are that cuisine skills might be learned through a gradual progression and may be reinforced by practicing the skills over time, rather than learning skills from a single nutrition education class.

Food Literacy as a Multidimensional Educational Outcome

The literature is growing in understanding that nutrition awareness needs to be comprehended as part of a wider food-literacy framework. Heaney et al. (2024) conducted a scoping review and found that there was a general improvement in food-literacy outcomes, though there was a great variation of the interventions in their theoretical basis, the populations they concerned and the approaches used. Importantly, the review identified that interventions explicitly based on a theory of food literacy were more likely to focus on food literacy more fully.

A similar food-literacy program for university students was also developed and assessed by Ko et al. (2024). The practical work and theoretical learning that they produced was a good indication of how beneficial it is to include knowledge-based learning and hands-on activity. The study also identified the need for gaining student needs, preferences and obstacles in developing food-literacy interventions.

The multi-faceted nature of food literacy is also evident in recent teaching kitchen research. Rosenau et al. (2024) investigated a teaching-kitchen-based planetary-health curriculum and emphasized the potential for teaching nutrition, health, sustainability and providing hands-on food preparation. This implies that the learning of culinary skills can go beyond individual nutrition awareness to a greater understanding of food systems and sustainable food consumption.

Croxford et al. (2024) also explained the difference between culinary medicine and culinary nutrition, highlighting the growing importance of hands-on application of food preparation content within health and nutrition education. They have shown that culinary strategies are being integrated into educational and health environments due to the ability to connect the nutrition recommendations to the typical food environment.

Challenges and Limitations in Existing Literature

The literature generally justifies the practical education of culinary arts, but there are some drawbacks to this. Firstly, the characteristics of intervention studies vary widely in terms of the length of intervention, intervention content, intervention methods, target populations, and outcome measures. When applying the results of the reviewed studies to the development of cooking

interventions, it is challenging to identify which aspects of cooking programs are effective, as cooking intervention descriptions vary and measurement tools are inconsistently used (Van der Horst et al. 2024). Vaughan et al. (2024) also called for more uniformity in the assessment of food literacy and confidence with cooking.

Second, evidence concerning actual dietary behavior is less consistent than evidence concerning cooking skills and self-efficacy. While cooking interventions can help to increase students' confidence and knowledge, they do not necessarily result in lasting changes in food consumption. In this context, the systematic review conducted by van der Horst et al. (2024) is especially salient as compared to the relative scarcity of dietary-intake improvements despite frequent improvements in cooking-related outcomes.

Thirdly, social and contextual factors affect culinary education. The impact of the cooking education may be affected by the students' access to food, the students' household skills, socioeconomic factors, cultural tastes, the availability of proper facilities, and the availability of suitable facilities. Therefore, culinary education should be seen not as a stand-alone intervention but rather as a part of the educational and food environment.

Research Gap

The literature reviewed shows some significant interest in the area of practical culinary training, food literacy, cooking competencies and nutrition awareness and there are some gaps. Current evidence is largely quantitative, focused on measuring cooking confidence, food consumption or specific nutrition outcomes after an intervention. Less emphasis has been placed on the qualitative meanings and the pedagogical aspects of how practical education in the culinary arts can help to raise nutrition awareness. In addition, current interventions have different theoretical underpinnings, learning content, length, and evaluation of outcomes. The importance of increased consistency in food literacy and cooking competency conceptualisation and assessment has been identified in recent reviews (Ares et al., 2023; Heaney et al., 2024; van der Horst et al., 2024; Vaughan et al., 2024). Therefore, a qualitative secondary-data study can help in synthesizing and consolidating existing data and uncovering commonalities in the findings regarding the preparation of nutrition knowledge, cooking ability, confidence with food, healthy food choices and overall food literacy through practical culinary education. The current study aims to fill these gaps by adopting a qualitative thematic analysis approach to analyse the existing scholarly and documentary data, resulting in an integrated understanding of the role of practical culinary learning in education for students.

Findings and Discussion

The results of the qualitative analysis of secondary literature were five major themes on the role of practical culinary education in raising nutrition awareness among students, namely: (1) nutrition knowledge development, (2) cooking skill and self-efficacy development, (3) food literacy and food choice development, (4) experiential learning and student involvement, and (5) problems in

transferring culinary knowledge into sustainable nutrition. The themes show that it is also possible to introduce practical education in the kitchen as an add-on to the traditional nutrition lessons, and to link theory to real-life food habits. But evidence also indicates that a surge in nutrition awareness does not lead to a corresponding behavioral shift right away or persist over time.

Development of Nutrition Knowledge

The first major finding is that, through the application of the nutrition concepts while preparing real food and incorporating the theory into practice, the culinary students' knowledge of nutrition could be reinforced. Students are not exposed to the ideas of nutrients, food groups, portion sizes and healthy diets only in the classroom; they are exposed in selecting ingredients, reading recipes, measuring amounts of food, cooking foods and assessing the nutritional qualities of foods. The literature reviewed suggests that this hands-on experience can enhance and improve the usefulness and understanding of nutritional information. A combination of theory and practice food education has shown to be beneficial, as Mancone et al. (2024) showed that a multifaceted food-literacy intervention was beneficial for adolescents in terms of their nutrition knowledge and their self-regulation. Likewise, Omidvar et al. (2023) found that the school-based food and nutrition literacy interventions had a positive impact on the children's competencies and knowledge related to food.

The results of this study indicate that in the field of culinary education it is possible to transform nutrition from an abstract academic subject into a life skill. Learning is made more meaningful and may be retained better by having students learn about the nutrition of their selections, and at the same time help prepare the food. This is in line with the definition of Food Competence of the Food Literacy Framework proposed by Vidgen and Gallegos (2014) where food competence refers to a combination of knowledge and a capacity to apply it in real-life contexts. As such, applied (culinary) education seems to be a promising means of bridging the gap between nutrition knowledge and application.

Development of Cooking Skills and Self-Efficacy

The other major theme is that of teaching students practical cooking skills and confidence. All examined studies found that experiential cooking activities can raise students' awareness of cooking food and boost their confidence in cooking simple cooking skills. In their systematic review on school-based cooking classes, Vaughan et al. (2024) noted that an increase in cooking skills and self-efficacy in cooking were important outcomes of cooking interventions with children. Likewise, van der Horst et al. (2024) reported that cooking program outcomes were most commonly factors of cooking knowledge, cooking self-efficacy, and children's cooking participation.

This is especially significant since knowledge about healthy eating could have little practical use, if students do not feel they are able to prepare healthy foods for themselves. This difference could be bridged through culinary education by allowing students to have multiple practices to prepare food in a safe learning space. While students are learning how to prepare simple meals, knowledge of ingredients, equipment in the kitchen and how to read a recipe may lead to increased

independence and confidence in food preparation.

This is also related to the notion of food literacy. Writing about cooking competence, a practical aspect of food literacy, to help people put knowledge into practice. From the literature, it can therefore be concluded that the culinary education as a practical subject should not be regarded as an extra-curricular activity. Instead, it can be considered as a way for students to acquire skills that could assist them in the future on managing food themselves.

Development of Food Literacy and Informed Food Choices

The third theme that has been arising from the analysis is the role of culinary education in the greater food literacy. Results indicate that hands-on cooking activities may help to raise awareness of ingredients, food quality, meal composition, food preparation methods, and the consequences of food choices. Ares et al. (2023) highlight that there are several aspects to food literacy among young people, namely functional, interactive and critical competencies. The competencies mentioned can be further developed in a practical culinary setting where students can have first-hand experience with the food and decide what and how to cook it.

There are also references to food literacy as more than just cooking skills in the literature. It includes the ability to plan meals, choose food ingredients, read and interpret food information, and make food choices that are consistent with health and nutrition. Similarly, Omidvar et al. (2023) provide evidence that food and nutrition literacy programmes can have a positive impact on various aspects of food competence in school-aged children.

In this role, culinary education may help students to be better-informed consumers of food. For instance, when cooking a meal, students might analyze the ingredients, determine which are healthier options, think about the amount of each ingredient used and how the cooking process affects the nutritional value of the food. These activities will allow students to learn decision making skills which are not solely available in the theoretical lessons of nutrition.

Experiential Learning and Student Engagement

The fourth important result is the significance of experiential learning. From the literature, it was found that students are more active during the implementation of nutrition education if they are involved in doing, observing, tasting, and reflecting on nutrition education rather than listening to theoretical nutrition education. In a study by Elsborg et al. (2022), it has been demonstrated how the use of food-camp experiences can enhance various aspects of food literacy, such as knowing, doing, sensing, caring, and wanting. This multi-dimensional approach suggests that food education might be a learning experience that causes intellectual, practical, sensory, and emotional involvement.

Practical culinary education provides the opportunity for students to learn from their hands-on experience, thus facilitating an environment in which learning takes place. Cooking can also

encourage teamwork, team communication, creativity, problem solving, and responsibility. These experiences can help nutrition education be more relevant to students' lives by making the nutritional principles more evident in real food contexts.

St Pierre et al. (2024) also identified influences on their food-related knowledge and decisions as described by participants in their experiential food education program in school. These results indicate that experiential learning in food education has educational value other than the actual learning in the classroom. The sustainability of these effects, however, will rely on ongoing opportunities to engage in food-related skills and broader environment in which students make food decisions.

From Nutrition Awareness to Healthy Eating Practices

While, overall, the literature backs the educational benefits of culinary programs, an important finding is that increases in knowledge and cooking skills do not always result in improvements in dietary intake. This is one of the most significant results from the present review. The cooking competence and food knowledge gains were found by Vaughan et al. (2024) to be more apparent; however, the changes in vegetable consumption were less pronounced. Likewise, van der Horst et al. (2024) found that cooking knowledge and self-efficacy were more likely to improve after interventions than changes in dietary intake were.

This is a finding that suggests that nutrition awareness should not be equated with healthy eating behaviour. Factors like accessibility, affordability, family practices, peer influence, cultural preferences, convenience and the availability of processed foods may mean students understand the importance of balanced diets and have cooking skills and yet are eating unhealthy foods.

Thus, the culinary program can be considered only a part of a food environment, not a standalone answer to an unhealthy food environment. Awareness and competence can lay the groundwork for the development of healthier practices, but the uptake of these competencies into action will depend on the supportive social, economic and institutional conditions.

Challenges in Implementing Practical Culinary Education

The fifth theme is related to the difficulties of incorporating culinary education in schools. Cooking programs have great potential but factors that can affect the success of the program include the length of time, the background of the teacher, the availability of kitchens and equipment, financial support, curriculum time, class size, and institutional support. Both Vaughan et al. (2024) and van der Horst et al. (2024) revealed significant differences between cooking interventions in terms of intervention length, intervention content, intervention delivery and outcome measures.

Another challenge is the integration of the culinary education in the already overstuffed school curriculum. Schools might give greater emphasis to traditional curriculum subjects that are traditionally evaluated, which may result in not having enough time available for food

education. Schools may focus on traditionally assessed academic subjects and have limited time available for food education. In addition, some facilities, equipment and ingredients are needed for culinary activities, and safety procedures must be followed. These requirements could form a barrier, especially in educational institutions where the resources are limited.

The literature thus offers that the teaching of cooking is not a part of the curriculum to be planned separately but needs to be planned as part of the curriculum. Cooking and science, cooking and health, cooking and math, cooking and environmental education, and cooking and life skills may be more likely to be implemented in a sustainable fashion.

Overall Discussion

Overall, the results offer robust qualitative findings that nutrition awareness of students can be fostered through the connection of knowledge, skills, confidence, and food decision making when a practical approach is used to teach culinary arts. The results correspond with those obtained by Vidgen and Gallegos (2014) who developed an approach to conceptualize food competence as having multiple dimensions in the Food Literacy Framework. Cooking in a practical manner gives students opportunities to go beyond knowing about food and do food related activities, thus reinforcing the practical aspect of food literacy.

The results also align with the work of Ares et al. (2023) who consider that food literacy does not only require knowledge of nutrition but also a range of other skills in young people. The understanding of cooking education is therefore that it is an experiential path, in which nutrition awareness can become "practically meaningful. The two systematic reviews conducted by Vaughan et al. (2024) and van der Horst et al. (2024) also support this interpretation, showing that there is a relative consistency in improvements in cooking related outcomes, and some uncertainty in the effect on actual dietary intake.

The results of the research have significant educational implications. Strengthening nutrition education can be achieved by integrating nutrition education with food experiences in school. Teachers can do more than just teach students what a healthful diet is, they can give students chances to plan a healthful meal, prepare it, evaluate it, and reflect upon it. This can have a positive impact on nutrition awareness as well as cooking confidence, independence, nutrition literacy and decision making skills.

Meanwhile, the results raise concerns about using culinary education as a one-to-one or automatic tool for influencing dietary choices. It seems that knowledge and skills are required but these may be insufficient to achieve lasting dietary change. Ecosystems of families, socioeconomic factors, food availability, cultural factors and other food environments should all be taken into account. The best method is probably one that integrates a nutrition and food-literacy plan into a comprehensive program of food preparation.

In general, the results of the study indicate that practical culinary learning has the potential to

improve nutrition awareness by means of knowledge building, practical skills acquisition, cooking self-efficacy and food literacy in response to the three research questions. But it requires the context of education and society to play a role in the maintenance of healthy eating behaviors. Hence the study suggests that the teaching of cooking should not be viewed merely as teaching a domestic skill, but as fostering a range of life-long skills which can enable students to understand, appraise, prepare and make judgements about food.

Conclusion

The results of this qualitative study indicate that the study of practical culinary education can be a meaningful tool for imparting knowledge of nutrition and for enhancing the overall food literacy of students. Culinary education provides students with the knowledge and skills needed to translate theoretical concepts into practical, food-related skills through hands-on activities, including food preparation, ingredient selection, meal planning and cooking. The evidence reviewed suggests that such experiences have the potential to improve the nutritional knowledge, cooking skills, confidence, self-efficacy, and food choice skills of students. The results also suggest, however, that a more knowledgeable and competent cook is not necessarily a more willing cook in the long term, as socio-economic status, family culture, food availability and the environment in which food is prepared all affect a student's food behaviours. Thus, food-literacy education should not be viewed as an independent program but rather as a complementary program to traditional nutrition education in a food-literacy approach in order to improve the skills of the students in culinary education. In general, teaching pupils the understanding, preparation and evaluation of food can give them transferable life-long skills and help to build their informed, confident and healthy attitudes to food.

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